

Modeling and Simulation

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Recent modeling and simulation activities include specific advancements in simulator acquisition and design, flight simulator flight training device acceptance and qualification standards, flight crew training, and flight research laboratories.

Advances directly related to acquisition involve the application of simulation-based acquisition and simulation-based design principles currently being applied to the Joint Strike Fighter program. To meet the training and analysis, test, and evaluation requirements for the program, a new mission level modeling tool, the Joint Interim Mission Model (JIMM), was created. JIMM is a merger of Suppressor capabilities into the Simulated Warfare Environment Generator, a mission-level model (MLM) developed by the Navy. Suppressor is an MLM developed by the Air Force. Within an MLM, one can evaluate the effectiveness and survivability of both current and futuristic vehicles and systems within a digital battle space.

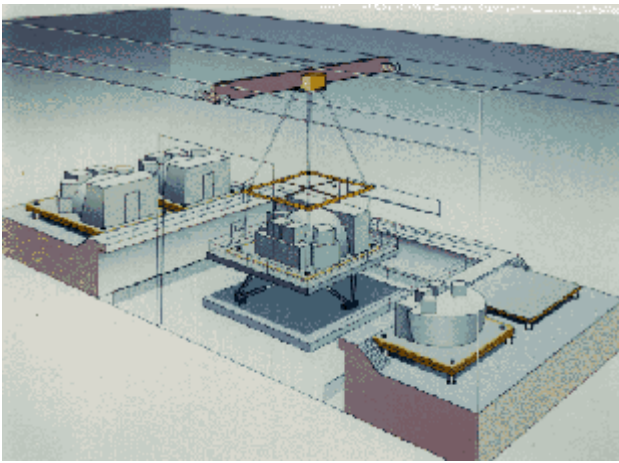
The model can be operated in a constructive or non-real-time mode to provide analysts and designers an opportunity to assess the effectiveness of system modes or configurations. Results and ultimate system requirements can be further refined in a virtual or real-time mode using pilot feedback and scenario outcomes such as exchange ratios, system lethality, or survivability.

To enhance the overall design, effectiveness, and use of each type of flight simulator and training device, a number of key areas are being reviewed for possible update or standardization, including device descriptions, requirement definition, and standardized customer acceptance test methods. Recommendations to qualification related documents for each level of device are also expected to surface. Efforts to date have included planning sessions and discussions by committee members representing the simulator industry and government research and regulatory organizations.

The Air Force embarked upon a new effort called Distributed Mission Training (DMT), which incorporates simulation system advances to support joint training initiatives, cooperative engagement, and mission rehearsal. Among the first DMT-based systems is the F-16 Mission Training Center, now in development. This center will train pilots using an immersive warfighting regime to enable them "to train the way they fight". The center meets the Air Force Air Combat Command's challenge to immerse the warfighter in a realistic, integrated training environment.

Each center consists of two to four locally networked devices, threat and modular control equipment stations, and instructor operator station, a mission observation station, and a brief/debrief station.

NASA-Langley has constructed a multifaceted motion- and fixed-based flight



simulation research laboratory known as the Cockpit Motion Facility (CMF). It consists of four fixed-base simulator sites and one motion-base simulator site.

Three new state-of-the-art flight simulators are completing

construction: the Research Flight Deck Simulator, the B-757 Integration Flight Deck Simulator, and the Generic Flight Deck Simulator. A fourth is tentatively planned to support advanced general aviation research. All are designed to operate as a motion-base simulator for experiments that require motion cueing and as fixed base simulators.

The Cockpit Motion Facility (CMF) motion system is a high-performance state-of-the-art 76-in., six-degree-of-freedom synergistic motion system that utilizes frictionless hydrostatic bearing servo actuators. The simulators are moved from their fixed-base location to the CMF motion base (located in the center of the building) through the use of an overhead crane system.